REMARKS

Claims 1-29 are now pending in the application. While Applicant disagrees with the current rejections of the claims, Applicant has amended the independent claims in the interest of expediting prosecution. Applicant reserves the right to pursue these claims as previously presented in one or more continuing applications. The Examiner is respectfully requested to reconsider and withdraw the rejections in view of the amendments and remarks contained herein.

SPECIFICATION

The Title has been amended per the Examiner's request. Therefore, this objection is now moot.

REJECTION UNDER 35 U.S.C. § 102

Claims 1, 2, 5, 6, 9, 11, 12, 15, 16, 19, 21 and 23 are rejected under 35 U.S.C. § 102(b) as being anticipated by Qian, U.S. Pat. No. 6,512,352. This rejection is respectfully traversed.

With respect to Claim 1, Qian fails to show, teach or suggest a coupled inductor having first and second windings, wherein the first winding and the second winding having a coefficient of coupling that is greater than or equal to 0.99. Qian fails to show, teach or suggest the first winding has a number of turns N1, the second winding has a number of turns N2, and a turns ratio N1/N2 is set to a predetermined value of at least two.

The Examiner has failed to support a prima facie case under 35 U.S.C. §102 and/or 35 U.S.C. §102 with an inherency argument. "A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil co. of California*, USPQ2d 1051, 1053 (Fed. Cir. 1987). **The Examiner admits that the Qian reference is completely silent as to the coefficient of coupling of the windings.** Therefore, the rejection of Claim 1 under 35 USC §102(b) (without an inherency argument) is improper and must be withdrawn.

The Examiner argues that Qian shows all of the elements of Claim 1 but tacitly admits that **Qian is silent with respect** to the requirement that the coupling coefficient of the coupled inductors is approximately equal to one. To support the current rejection, the Examiner must argue that having a coefficient of coupling of approximately one in a coupled inductor is inherently taught by Qian.

Not only is there no support for inherency as will be addressed further below, Qian **addresses the situation when the coupled inductors have a SIGNIFICANT leakage inductance (represented by L_k) that causes HIGH voltage spikes across the switches.** Therefore, as best understood by Applicants, Qian **does not contemplate** using a coefficient of coupling greater than 0.99.

Qian **shows** a leakage inductance L_k representing a significant leakage inductance of the winding N1 of the coupled inductors. "As is made clear below, those of ordinary skill will recognize that inductor L_k is not a separate component, but represents the leakage inductance of winding N1." Col. 2, lines 29-32. Qian goes on to state in Col. 2, lines 55-63:

> One disadvantage of circuit 200 is that a high voltage spike occurs across switch S1 when S1 turns off (e.g., at time t2, See FIG. 3e) **because the leakage energy of winding N1 cannot be transferred to winding N2. The leakage energy in L_k charges the output capacitance (not shown) of S1 through conducting switch S2 which causes a high voltage stress across S1.** As a result, a high voltage rated MOSFET switch must be used in the circuit 200 which significantly increases the power loss and reduces the efficiency.

To address the problem of leakage inductance L_k, Qian proposes adding **an active clamp circuit to handle the high voltage stress caused by the significant leakage inductance L_k.** Qian Col. 4. The active clamp circuit includes switch S3 and a capacitor C_r in parallel with the inductance L_k. The active clamp circuit prevents the HIGH voltage spikes across the switch S1 by absorbing the power in the capacitor.

In support the incorrect idea that all transformers necessarily tend to have a coupling coefficient of 1, the Examiner also refers to the Stratton reference (U.S. Pat. No. 4,273,051). The fact that a certain characteristic **may occur or be present** in the prior art reference is not sufficient to establish inherency of that characteristic. ***In re Rijckaert***, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993) (emphasis added). The Federal Circuit has clearly stated that:

> To establish inherency, the extrinsic evidence 'must make clear that the missing descriptive matter is **necessarily** present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. Inherency, however, may not be established by probabilities or possibilities.'

In re Robertson, 49 USPPQ2d 1949, 1950-1951 (Fed. Cir. 1999) (emphasis added).

"In relying upon the theory of inherency, the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic **necessarily** flows from the teachings of the applied

prior art." ***Ex Parte Levy***, 17 USPQ2d 1461 (Bd. Pat. App. & Inter. 1990) (emphasis original). Therefore, the coupling coefficient of approximately one must **necessarily flow** from the teachings of the Qian reference. **Applicant respectfully asserts that this is not the case here**.

Even if some prior art transformers may commonly have a coefficient of coupling of 0.998, this fact is not dispositive here. Transformers can also have other coefficients of coupling as demonstrated by other teachings in the relied upon Stratton reference. In particular, **Stratton expressly recommends coefficients of coupling K in the range of 0.5 to 0.9**. See Col. 5, lines 48-51. Qian addresses coupled inductors with leakage inductance L_k that is significant enough to cause HIGH voltage spikes.

Furthermore, Claim 1 recites a coupled inductor having first and second windings **that are connected in series** to form a common node such that the first winding and the second winding have the same polarity. The first and second windings of the Stratton reference show windings that are **not connected in series**. The windings in Stratton are wound around a common core but are not directly connected together.

Therefore, while the Examiner may have provided a secondary reference that discloses one transformer having a coupling coefficient of 0.998 (**as well as in the range of 0.5 to 0.9**), this does not necessarily mean that the coupling coefficient of the particular coupled inductor in Qian is **necessarily** the same as is required to support an inherency argument under 35 U.S.C. §102. Furthermore, Qian assumes a significant leakage inductance and adds the active clamp circuit to accommodate the leakage inductance.

Therefore, Applicant respectfully asserts that the Examiner has failed to properly support his rejection under either 35 U.S.C. §102 and/or 35 U.S.C. §102 with an inherency argument.

Qian does not show, teach or suggest using a turns ratio N1/N2 that is set to a predetermined value of at least two. The Examiner ***incorrectly*** states that "Applicant has not disclosed that a turns ratio of two solves any stated problem or is for any particular purpose and it appears that the invention would perform equally well with any other turns ratio". Applicant **expressly** described the particular purpose and advantages of the claimed turns ratio:

> **[0021]** The coupled inductor 36a may have a first winding of N1 turns and a second winding of N2 turns. A turns ratio of N1/N2 may be set to a predetermined value to control the flow of energy through the coupled inductor 36a. For example, with a turns ratio of 0, a standard topology buck converter is formed. With a turns ratio of 2, the duty cycle of the voltage regulator is approximately two times greater than the duty cycle for the standard topology buck converter, the current flowing through the coupled inductor 36a is approximately one-half the amplitude, and the voltage impressed across the drain-source of the freewheeling switch 34a is less than the voltage impressed across the drain-source of the standard topology buck converter. The voltage impressed across the drain-source of the freewheeling switch 34a is approximately, $Vds \cong (Vin - Vout) * \left(\frac{N2}{N1+N2}\right) + Vout$. In contradistinction, in a standard topology buck converter the voltage impressed across the drain-source of the freewheeling switch is approximately, $Vds \cong Vin$.
>
> **[0022]** Therefore, the freewheeling switch 34a may be selected to have a lower withstanding voltage, Vds; and by using a similar die size to what a standard topology switch would use, the Rds(on) for the freewheeling switch 34a may also be lower.

Applicant's specification at paragraphs [0021]-[0022]. Therefore, Applicant expressly set forth specific advantages when using the claimed turns ratio. For example, the freewheeling switch may be selected to have a lower withstanding voltage and the Rds(on) may be lower. Qian adds an active claim circuit and does not suggest

altering the turns ratio and its impact on withstanding voltage. None of these limitations are taught or suggested by the prior art references.

Claim 1 is therefore allowable over the prior art of record. Claim 11 is allowable for at least similar reasons as Claim 1. The remaining Claims are either directly or indirectly dependent upon allowable Claims 1 and 11 and are therefore allowable for at least similar reasons.

With respect to Claims 26-29, Qian also does not show, teach or suggest using a freewheeling switch that has a lower withstanding voltage than a conduction switch.

Switches that have a lower withstanding voltage typically have a lower Rds(on) or Vce(sat) than a switch with a comparable die size and a higher withstanding voltage. The lower Rds(on) or Vce(sat) may result in lower conduction losses. In addition, the switching losses may also be lower due to the lower voltage impressed across the freewheeling switch.

Therefore, Claims 26 and 27 are allowable for at least this reason. Claims 28 and 29 are allowable for at least similar reasons as Claims 26 and 27.

CONCLUSION

It is believed that all of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicant therefore respectfully requests that the Examiner reconsider and withdraw all presently outstanding rejections. It is believed that a full and complete response has been made to the outstanding Office Action and the present application is in condition for allowance. Thus, prompt and favorable consideration of this amendment is respectfully requested. If the Examiner

believes that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (248) 641-1600.

Respectfully submitted,

Dated: February 15, 2006

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